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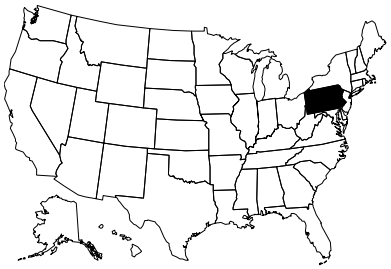

Contact Information

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http://www.dep.state.pa.us/dep/deputate/watermgt/watermgt.htm

Program Description

The basics of Pennsylvania's current water quality monitoring program began in the late 1960s and has included elements of bioassessment in some form since its inception. The primary objectives of the water quality monitoring program are to define surface water quality status and trends and to evaluate compliance with discharge permit limits.

The State of Pennsylvania uses biological assessments in several program areas. The Statewide Surface Water Assessment Program (SSWAP), started in 1997, was developed to assess all 83,000 miles of streams in the state. The first comprehensive statewide assessment is scheduled for completion by 2007. After five seasons, approximately two thirds of Pennsylvania's surface waters have been assessed. Assessments are based on an evaluation of the instream habitat and macroinvertebrate community composition. All assessed streams are determined to be either impaired or unimpaired and a source and cause is listed for the former. These data are compiled into an MS Access database and GIS stream layer that is updated yearly and submitted to USEPA as part of the 305(b) report. Impaired reaches are placed on the 303(d) list and scheduled for follow-up TMDLs. Due to increasing complexities in the TMDL program, the assessment field methodology will be refined and enhanced in order to satisfy data needs for TMDL development.

Pennsylvania's Antidegradation Program also uses biological assessments based on a modified version of USEPA's Rapid Bioassessment Protocols (RBP) methodology to define aquatic life use designations of candidate streams. Biological samples are collected, subsampled, identified, and selected metrics are generated and analyzed. Candidate streams are compared to reference streams to determine if they qualify for designation as High Quality or Exceptional Value Waters. To alleviate the problem of site-specific reference site variability, staff biologists are currently working to develop a set of regionalized Reference Condition scores that can be compared to candidate streams.

Biological assessments are also an important component of the Surface Water Quality Monitoring Network (WQN). Biological samples are collected at 26 fixed stations three times per year (spring, summer, and fall) and once a year (summer) at 123 additional stations using the same RBP methodology referenced above. These data, in conjunction with bimonthly water chemistry samples, are used to monitor long-term trends in water quality on the major streams in the Commonwealth.

Fish are collected at approximately 35 WQN stations each year. Fillets from these fish are analyzed for contaminants such as heavy metals and pesticides. This tissue analysis is used to generate consumption advisories for fish living in any contaminated surface waters.

In order to more effectively meet its water quality objectives, Pennsylvania has fostered several cooperative bioassessment partnerships. Through contracts with the PA DEP, the Pennsylvania Fish and Boat Commission (PFBC), Susquehanna River Basin Commission (SRBC), and Interstate Commission on the Potomac River Basin (ICPRB) assist with SSWAP assessments. The Department plans to contract with the USGS to collect WQN samples. There are also cooperative efforts with citizen monitoring groups for water quality monitoring data collection and 305(b) reporting purposes.

While Pennsylvania's bioassessment efforts have increased in recent years (Statewide Surface Waters Assessment program), additional bioassessment challenges are being tackled. Department biologists are currently working to develop fish-based bioassessment methodologies for larger streams, refine lake assessments for 303(d) reporting purposes, and bioassessments of specialized habitats; such as limestone, glide/pool dominated, and non-wadeable waters.

Documentation and Further Information

Commonwealth of Pennsylvania 2000 Water Quality Assessment 305(b) Report:
http://www.dep.state.pa.us/dep/deputate/watermgt/Wqp/WQStandards/305_wq2000_narr.htm

Commonwealth of Pennsylvania 2001 305(b) UPDATE:
http://www.dep.state.pa.us/dep/deputate/watermgt/Wqp/WQStandards/305_wq2001_narr.htm

DRAFT 2002 Section 303(d) Report, List of Impaired Waterbodies, June 2002:
http://www.dep.state.pa.us/dep/deputate/watermgt/Wqp/WQStandards/303d-Report.htm

Pennsylvania's Surface Water Quality Monitoring Network (WQN), revised 2001:
http://www.dep.state.pa.us/dep/deputate/watermgt/wqp/wqstandards/Facts/BK0636-1.pdf

Water Quality Assessment and Standards Fact Sheets:
http://www.dep.state.pa.us/dep/deputate/watermgt/wqp/wqstandards/Facts/Pubs-c.htm

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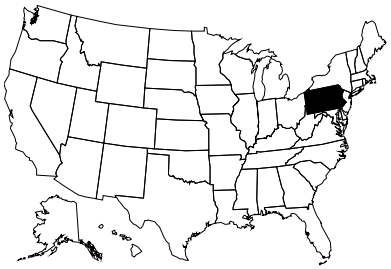

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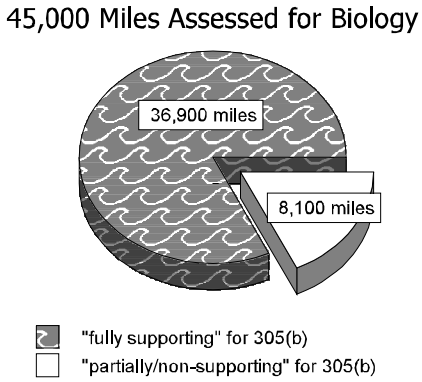
Programmatic Elements

Uses of bioassessment within overall water quality program	✓	problem identification (screening)
	✓	nonpoint source assessments
	✓	monitoring the effectiveness of BMPs
	✓	ALU determinations/ambient monitoring
		promulgated into state water quality standards as biocriteria
	✓	support of antidegradation
	✓	evaluation of discharge permit conditions
	✓	TMDL assessment and monitoring
		other:
Applicable monitoring designs	✓	targeted (i.e., sites selected for specific purpose) *(special projects only)*
	✓	fixed station (i.e., water quality monitoring stations) *(comprehensive use throughout jurisdiction)*
		probabilistic by stream order/catchment area
		probabilistic by ecoregion, or statewide
	✓	rotating basin *(special projects only)*
		other:

Stream Miles

Total miles *(determined using 1/24,000 scale streams GIS coverage)*	**83,000**
Total perennial miles	–
Total miles assessed for biology	**45,000**
fully supporting for 305(b)	36,900
partially/non-supporting for 305(b)	8,100
listed for 303(d)	8,100
number of sites sampled	7,435
number of miles assessed per site*	–



*Stations are placed at the mouths of major tributaries and on mainstems; towns are bracketed (upstream/downstream) depending on landuse observed while in field.

Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Fishery Based Uses	
ALU designations in state water quality standards	Four designations: Cold water fishes, Warm water fishes, Migratory fishes, Trout stocking	
Narrative Biocriteria in WQS	none - Antidegradation protocols used to support general aquatic life standard are under development, not statutory - found in Chapter 93 of Statutory Code.	
Numeric Biocriteria in WQS	none	
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	✓	assessment of aquatic resources
	✓	cause and effect determinations
	✓	permitted discharges
	✓	monitoring (e.g., improvements after mitigation)
	✓	watershed based management
Uses of bioassessment/ biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	none	

Reference Site/Condition Development

Number of reference sites	**~100 total**	
Reference site determinations		site-specific
	✓	paired watersheds
	✓	regional (aggregate of sites)
		professional judgment
		other:
Reference site criteria	Based on stream classification in the antidegradation program, land use, and habitat: primarily forested, no water quality criteria violations, excellent habitat, and minimal siltation.	
Characterization of reference sites within a regional context		historical conditions
		least disturbed sites
		gradient response
		professional judgment
	✓	other: minimally disturbed
Stream stratification within regional reference conditions		ecoregions (or some aggregate)
		elevation
		stream type
		multivariate grouping
		jurisdictional (i.e., statewide)
	✓	other: drainage area, land use, use designations, gradient, size and other regionalization other than ecoregion
Additional information	✓	reference sites linked to ALU
		reference sites/condition referenced in water quality standards
		some reference sites represent acceptable human-induced conditions

Field and Lab Methods

Assemblages assessed	✓	benthos *(100-500 samples/year; multiple seasons, multiple sites - broad coverage for watershed level)*
	✓	fish* *(<100 samples/year; single season, multiple sites - not at watershed level)*
		periphyton
	✓	other: phytoplankton *(<100 samples/year; single season, multiple sites - not at watershed level)*
Benthos		
sampling gear		multiplate, D-frame and kick net (1 meter); >800 micron mesh
habitat selection		riffle/run (cobble)
subsample size		100 count
taxonomy		genus
Fish*		
sampling gear		backpack and boat electrofishers
habitat selection		multihabitat
sample processing		length measurement and anomalies
subsample		none
taxonomy		species
Habitat assessments		visual based; performed with bioassessments
Quality assurance program elements		standard operating procedures, quality assurance plan, periodic meetings and training for biologists, taxonomic proficiency checks, specimen archival

*Pennsylvania Fish & Boat Commission provides fish data to PA DEP. For more information, contact Rick Spear, PA Fish & Boat Commission, 450 Robinson Lane, Bellefonte, PA 16823, Phone: 814/359-5233, e-mail: rspear@state.pa.us.

Data Analysis and Interpretation

Data analysis tools and methods	✓	summary tables, illustrative graphs
	✓	parametric ANOVAs
	✓	multivariate analysis
	✓	biological metrics *(return single metrics - use endpoint for each single metric)*
	✓	disturbance gradients
		other:
Multimetric thresholds		
transforming metrics into unitless scores		Still in the process of evaluating the best approach (considering 75th and 95th percentile of reference population and cumulative distribution function)
defining impairment in a multimetric index		Still in the process of evaluating the best approach (considering 75th and 95th percentile of reference population and cumulative distribution function)
Multivariate thresholds		
defining impairment in a multivariate index		In the process of evaluating the best approach
Evaluation of performance characteristics	✓	repeat sampling *(two or three separate samples in the same riffle)*
		precision
		sensitivity
		bias
		accuracy
Biological data		
Storage		MS Access
Retrieval and analysis		SAS